

REMARKS

Reconsideration of the application in view of the amendments above and remarks below is respectfully requested.

I. Status of the Claims

Claims 1, 2, 7, 8, and 11 are herein amended. Support for these amendments can be found in, for example, p. 3, paragraph 37, and p. 4, Tables 1 and 2.

Claim 3 is herein cancelled without prejudice or disclaimer of the substantive matter therein and retaining the right to prosecute in a future continuation application.

Thus, claims 1, 2, and 4-11 are currently pending. Reconsideration of the pending claims in view of the following remarks is respectfully requested. No new matter is added by way of the present amendments.

II. Claim for Foreign Priority

The Examiner's acknowledgement that all certified copies of foreign priority documents have been received is noted with thanks.

III. Claim Rejections under 35 U.S.C. § 103(a)

U.S. Patent No. 6,001,150

Claims 1, 2, and 4-7 are rejected under 35 U.S.C. § 103(a) as being obvious over McCall et al. (U.S. Patent No. 6,001,150, "McCall"). Applicants respectfully traverse.

The Examiner contends that McCall discloses a raw material powder for compaction in a mold at a temperature below 100°C, which is warm molding. The raw material powder comprises a lubricant mixture for containing boric acid and at least one other powder metallurgy lubricant. The Examiner contends that McCall differs from the claims because it does not specifically teach lithium 12-hydroxystearate and the exact amount as recited in claims, but would find that one of ordinary skill in the art would have optimized ranges.

The invention of Claim 1 is a warm molding raw material powder in powder metallurgy, comprising a lubricant which consists of a hydroxy fatty acid salt having an average particle diameter of from 5µm to 100µm in a range of from 0.3 wt% to 2 wt%. The invention of Claim 2 is a warm molding raw material powder in powder metallurgy, comprising a lubricant which consists of a hydroxy fatty acid salt having an average particle diameter of from 5µm to 100µm in a range of from 0.3 wt% to 5 wt%.

By containing the above constitution, the present invention achieves the following effects, as listed in the Specification at page 6, lines 1-13:

According to the warm molding raw material powder and the warm molding method of the present invention, the flowing property of the raw material powder at a time of heating at a temperature exceeding 150°C does not deteriorate, and higher lubricating and pressing properties at a time of pressing-molding are obtained, when

compared with the properties of the conventional case which uses lithium stearate. In addition, the 12-hydroxy lithium stearate having an average particle diameter of from 5 μ m to 100 μ m can be easily and economically obtained by directly reacting a lithium compound with a 12-hydroxy stearic acid originated from inexpensive castor oil. Therefore, it is possible to reduce production cost thereof. (emphasis added)

In contrast, McCall is a novel composition of matter for the manufacture of a sintered metal article comprising a sinterable mixture consisting essentially of a metal powder and a lubricant, said lubricant being present in an amount of 0.1% to 5%, by weight, and said lubricant comprising a mixture of boric acid and at least one other powder metallurgy lubricant, said boric acid in said mixture providing improved processing characteristics in said manufacture. Here, please note that the invention of McCall thus contains boric acid as an indispensable component. (McCall, column 2, lines 37 – 41.)

By containing the above constitution, McCall achieves the following effects:

The improved properties of compacted parts made with lubricants consisting essentially of a mixture of boric acid and at least one other powder metallurgy lubricant are the lower flow times, the higher apparent densities, and lower pressures required to eject parts made with said lubricants from the mold. (McCall, column 3, lines 62 to 67)

Thus, when compared with the present invention, McCall has a clearly different constitution in containing boric acid as an indispensable component of the lubricant.

However, the present invention does not contain boric acid, and the components of the present invention are indispensable constituent features for obtaining a warm molding raw material powder with an excellent flowing property under high temperatures (150 to 190°C).

Here, with respect to the temperature for compaction, McCall describes the following in column 4, lines 11 to 12: “The mixture is compacted in a mold suitably at below about 100°C.” As is clear from the foregoing description, the present invention has a difference from McCall regarding the target temperature range; and, under a high temperature of 150 to 190°C, the present invention achieves the effect of improving the flowing property for the first time by using the constitution of claim 1.

Furthermore, in the Specification starting at page 2, line 5, the present application discloses the defect of using lithium stearate in conventional technology as follows:

However, in a case where the lithium stearate is mixed, although a melting point of the lithium stearate is about 220°C, there is a problem in that, if the raw material powder is heated at a temperature of 150°C or more, the flowing property of the raw material powder deteriorates. In addition, there is a problem in that sufficient lubricating and pressing properties cannot be obtained by using the lithium stearate.

McCall, however, recites lithium stearate as a specific example of the lubricant to be used. Therefore, it is clear that McCall does not recognize the object to be solved in the present invention.

For these reasons, claims 1 and 2 of the present invention has a different constitution from the invention of McCall, and is also non-obvious over McCall. Accordingly, Applicants respectfully request that the rejection be withdrawn.

As claims 3 to 6 depend from claim 1 or 2 either directly or indirectly, these claims, too, should be allowable.

Also, as claim 7 depends from claim 1, claim 7 should thus be allowable.

Lastly, as claim 8 depends from claim 7 and thus indirectly depends from claim 1, claim 8, too, should be allowable. Further, claim 8 is the warm molding method according to claim 7, further comprising the step of attaching a powder of hydroxy fatty acid salt having an average particle diameter of 50 μ m or less on a forming surface of the mold before the warm molding raw material powder is filled in the mold. Here, claim 8 has non-obviousness over the invention of McCall for at least the same reasons as those described above regarding claim 1.

U.S. Patent No. 6,001,150 in view of U.S. Publication No. 2001-0038802 A1

Claims 8-11 are rejected under 35 U.S.C. § 103(a) as being obvious over McCall et al. (U.S. Patent No. 6,001,150, “McCall”) in view of Ozaki et al. (U.S. Publication No. 2001-0038802 A1, “Ozaki”). Applicants respectfully traverse.

The Examiner states that McCall does not teach attaching a hydroxyl fatty acid salt (mold lubricant) having an average particle diameter of 50 microns or less on a mold before performing warm molding.

The Examiner states that Ozaki discloses a lubricant for die lubrication used during compaction pressure of a powder with a die while the lubricant is adhered by electrification to the surface of the die, the lubricant comprising a mixed powder of at least two different lubricants each having a melting point higher than a predetermined temperature of the compaction pressure. The Examiner contends that it would have been obvious to one of ordinary skill in the art to attach the lubricant having the claimed particle size on the surface of the mold used for compaction in the method of making sintered metal taught by McCall in order to obtain the sintered part having high density and low ejection force as taught in Ozaki. Furthermore, the Examiner contends it would have also been obvious to one skilled in the art to use lithium hydroxystearate because Ozaki teaches the same utility over the overlapping range.

Applicant respectfully traverses the rejection based on the above arguments recited against McCall as already discussed and on the arguments as follows.

Compared with the present invention, the invention of Ozaki has a clearly different constitution in containing at least two different lubricants as indispensable components.

With respect to the above difference, Ozaki describes the following in paragraph [0018]:

In order to achieve the above-mentioned objects using a die lubricating compaction technique, the present inventors earnestly researched combinations of lubricants for die lubrication. As a

consequence, it was discovered that in order to decrease the ejection force, a mixture (lubricant) of at least two kinds of lubricants, each having a melting point higher than the predetermined temperature of the compaction pressure, is effective as a lubricant for die lubrication which can adhere by electrification to the surface of a die that is at room temperature or preheated. (emphasis added)

As an example of the combined lubricants for achieving the above effect, Ozaki recites lithium stearate. However, in the Specification starting at page 2, line 5, the present application discloses the problem caused by using lithium stearate as follows:

However, in a case where the lithium stearate is mixed, although a melting point of the lithium stearate is about 220°C, there is a problem in that, if the raw material powder is heated at a temperature of 150°C or more, the flowing property of the raw material powder deteriorates. In addition, there is a problem in that sufficient lubricating and pressing properties cannot be obtained by using the lithium stearate.

Therefore, in the invention of Ozaki, which contains a mixture of lubricants such as lithium stearate, the above problem cannot be solved. In contrast, the present invention, which has as one object solving the above problem caused by using a conventional lubricant such as lithium stearate under high temperature, succeeds in solving the problem by the constitution of claim 8. The Specification starting at page 3, line 12, states:

The present invention is contrived to solve the aforementioned problem. An object of the present invention is to provide a warm molding raw material powder having a good flowing property at a high temperature, high lubricating and pressing properties at a time of press-molding, and being highly economical and a warm molding method using the warm molding raw material powder.

Furthermore, the invention of Ozaki is intended to obtain the lubricant which can be adhered to the surface of the die, even at room temperature (see paragraph [0017]), whereas claim 8 of the present invention is intended to provide a warm molding method with excellent flowing properties under high temperatures of 150 to 190°C; and, accordingly, the constitution to solve each object is also different.

For these reasons, Applicants believe that claim 8 of the present invention is non-obvious over McCall and Ozaki, whether taken singly or in combination, and therefore respectfully request that the rejection be withdrawn.

As claims 9-11 depend from claim 8, either directly or indirectly, these claims, too, should be allowable.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants believe that the application is in condition for allowance and earnestly solicit same.

If the Examiner believes there are any remaining issues which can be resolved by an Examiner's Amendment or a Supplemental Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

By 

Louis J. DelJuidice

Registration No.: 47,522

DARBY & DARBY P.C.

P.O. Box 770

Church Street Station

New York, New York 10008-0770

(212) 527-7700

(212) 527-7701 (Fax)

Attorneys/Agents For Applicant